<u>AMENDMENTS TO THE CLAIMS</u>

This listing of claims will replace all prior versions of claims in the application:

Listing of Claims:

1.   (Original) Apparatus for use in authentication comprising:

a storage medium configured to store a cryptographic key and a look up table (LUT); a first processor coupled to the storage medium, configured to generate an access code using the cryptographic key;

a converter coupled to the processor, configured to convert the access code into multiple tones encoded with the access code; and

an audio output unit configured to output the multiple tones encoded with the access code for authentication;

wherein the converter comprises:

a binary phase shift keying (BPSK) module configured to generate multiple parallel BPSK symbols; and

a second processor coupled to the BPSK module and the storage medium, configured to convert the BPSK symbols into the multiple tones using the LUT.

2.   (Currently Amended) The apparatus of claim 1, wherein either one of the first or second processor is further configured to repeat the BPSK symbols a selected number of times; and wherein the second processor converts repeated BPSK symbols into the multiple tones.

3.   (Original) The apparatus of claim 1, further comprising:

a clock module coupled to the first processor, configured to generate time elements; and

wherein the first processor is configured to generate the access code using the cryptographic key and a time element.

4.   (Original) The apparatus of claim 1, further comprising:

an actuator coupled to the first processor, configured to receive a user command; and

wherein, the first processor is configured to generate the access code when the user command is received.

5.   (Original) The apparatus of claim 1, further comprising:

a housing element configured to encase the storage medium, the first processor, the converter and the audio output unit; and

an opening through the housing element.

6.   (Original) The apparatus of claim 1, further comprising:

an amplifier coupled to the converter, configured to amplify the multiple tones; and

wherein the audio output unit is configured to output the amplified multiple tones.

7 .   (Original) The apparatus of claim 1, further comprising:

a display module coupled to the first processor, configured to display the access code.

8.   (Original) The apparatus of claim 1, further comprising:

a user input configured to receive a personal identification number (PIN);

wherein the converter is configured to convert the PIN into multiple tones encoded with the PIN; and

wherein the audio output unit is further configured to output the multiple tones encoded with the PIN for authentication;

9.   (Original) Apparatus for use in authentication comprising:

a storage medium configured to store a cryptographic key and a look up table (LUT);

a processor coupled to the storage medium, configured to generate an access code using the cryptographic key;

a converter coupled to the processor, configured to convert the access code into multiple tones encoded with the access code; and

an audio output unit configured to output the multiple tones encoded with the access code for authentication;

wherein the converter comprises:

a binary phase shift keying (BPSK) module configured to generate multiple parallel BPSK symbols; and

wherein the processor is configured to convert the BPSK symbols into multiple tones using the LUT.

10.   (Currently Amended) A method for use in authentication comprising: storing a cryptographic key and a look up table (LUT); generating an access code using the cryptographic key;

generating multiple parallel <u>binary phase shift keying (</u>BPSK<u>)</u> symbols based upon the access code;

converting the BPSK symbols into multiple tones encoded with the access code using the LUT; and

outputting the multiple tones encoded with the access code for authentication.

11.   (Original) The method of claim 10, further comprising:

repeating the BPSK symbols a selected number of times before converting the BPSK symbols.

12.   (Original) The method of claim 11, wherein repeating the BPSK symbols comprises repeating a set of three BPSK symbols the selected number of times; and

wherein converting the BPSK symbols comprises converting each set of three BPSK symbols into the multiple tones using the LUT.3.   (Original) The method of claim 10, further comprising:

adding to the multiple tones, reference tones with reference phases; and

outputting the reference tones with the multiple tones.

14.   (Original) The method of claim 10, further comprising generating time elements; and wherein generating the access code comprises generating the access code using the cryptographic key and a time element.

15.   (Original) The method of claim 10, further comprising receiving a user command;   and wherein generating the access code comprises generating the access code when the user command is received.

16.   (Original) The method of claim 10, further comprising: amplifying the multiple tones before outputting the multiple tones.

17.   (Original) The method of claim 10, further comprising:

receiving a personal identification number (PIN);

converting the PIN into multiple tones encoded with the PIN; and outputting the multiple tones encoded with the PIN for authentication.

18.   (Original) Apparatus for use in authentication comprising:

means for storing a cryptographic key and a look up table (LUT);

means for generating an access code using the cryptographic key;

means for generating multiple parallel BPSK symbols based upon the access code;

means for converting the BPSK symbols into multiple tones encoded with the access code using the LUT; and

means for outputting the multiple tones encoded with the access code for authentication.

19.   (Original) The apparatus of claim 18, further comprising means for repeating the BPSK symbols a selected number of times; and

wherein the means for converting the BPSK converts the repeated BPSK symbols.

20.   (Original) The apparatus of claim 18, further comprising means for adding to the multiple tones, reference tones with reference phases; and

wherein the means for outputting the multiple tones outputs the reference tones with the multiple tones.

21.   (Original) The apparatus of claim 18, further comprising means for generating time elements; and

wherein the means for generating the access code generates the access code using the cryptographic key and a time element.

22.   (Original) The apparatus of claim 18, further comprising means for receiving a user command; and

wherein the means for generating the access code generates the access code when the user command is received.

23.   (Original) The apparatus of claim 18, further comprising means for amplifying the multiple tones; and

wherein means for outputting the multiple tones outputs the amplified multiple tones.

24.   (Original) The apparatus of claim 18, further comprising:

means for receiving a personal identification number (PIN);

means for converting the PIN into multiple tones encoded with the PIN; and

means for outputting the multiple tones encoded with the PIN for authentication;

25.   (Original) Apparatus for use in authentication comprising:

a storage medium configured to store a cryptographic key;

a processor coupled to the storage medium, configured to generate an access code using the cryptographic key;

a converter coupled to the processor, configured to convert the access code into multiple tones encoded with the access code; and

an audio output unit coupled to the converter, configured to output the multiple tones encoded with the access code for authentication;

wherein the converter comprises:

a binary phase shift keying (BPSK) module configured to generate multiple parallel repeated BPSK symbols based on the access code;

an inverse fast fourier transform (IFFT) module coupled to the BPSK module, configured to perform IFFT on the repeated BPSK symbols to generate code symbols; and

an up-converter coupled to the IFFT module, configured to modulate the code symbols into the multiple tones encoded with the access code.

26.   (Original) A method for use in authentication comprising:

storing a cryptographic key;

generating an access code using the cryptographic key;

generating multiple parallel binary phase shift keying (BPSK) symbols based upon the access code;

repeating the BPSK symbols a selected number of times before converting the BPSK symbols;

performing inverse fast fourier transform (IFFT) on the repeated BPSK symbols to generate IFFT symbols;

modulating the IFFT symbols into the multiple tones encoded with the access code; and

outputting the multiple tones encoded with the access code for authentication.

27.   (Original) The method of claim 26, wherein repeating the BPSK symbols comprises repeating a set of three BPSK symbols the selected number of times; and

        wherein converting the BPSK symbols comprises converting each set of three BPSK symbols into the multiple tones using the LUT.

28.   (Original) Apparatus for use in authentication comprising:

        means for storing a cryptographic key;

        means for generating an access code using the cryptographic key;

        means for generating multiple parallel binary phase shift keying (BPSK) symbols based upon the access code;

        means for repeating the BPSK symbols a selected number of times before converting the BPSK symbols;

        means for performing inverse fast fourier transform (IFFT) on the repeated BPSK symbols to generate IFFT symbols;

        means for modulating the IFFT symbols into the multiple tones encoded with the access code; and

        means for outputting the multiple tones encoded with the access code for authentication.

29.   (Original) Apparatus for use in verification comprising:

        an audio input unit configured to receive multiple tones encoded with an access code;

        a converter coupled to the audio input unit, configured to recover the access code from the multiple tones encoded with the access code; and

        wherein the converter comprises:

                a down-converter configured to demodulate the multiple tones into IFFT symbols;

                a fast fourier transform (FFT) module configured to generate multiple parallel BPSK symbols from the IFFT symbols;

                a BPSK module coupled to the processor, configured to convert the BPSK symbols into an encoded interleaved bit stream of the access code;

                a de-interleaver coupled to the BPSK module, configured to de-interleave the encoded interleaved bit stream; and

a decoding module coupled to the de-interleaver, configured to recover the access code from the encoded de-interleaved bit stream.

30.   (Original) The apparatus of claim 29, further comprising:

a storage medium configured to store a cryptographic key; and

a processor coupled to the storage medium and the converter, configured to verify the access code using the cryptographic key and to grant access if the access code is verified.

31.   (Original) The apparatus of claim 30, wherein the audio input unit is further configured to receive multiple tones encoded with a personal identification number (PIN);

wherein the converter is further configured to recover the PIN from the multiple tones encoded with the PIN; and

wherein the processor is further configured to grant access if the access code and the PIN are verified.

32.   (Original) The apparatus of claim 30, further comprising:

a clock module coupled to the first processor, configured to generate time elements; and

wherein the processor is configured to verify the access code using the cryptographic key and a time element.

33.   (Original) The apparatus of claim 29, wherein the FFT module converts the multiple tones into repeated sets of BPSK symbols and generates a selected set of BPSK symbols; and

wherein the BPSK module converts the selected set of BPSK symbols.

34.   (Original) A method for use in verification comprising:

receiving multiple tones encoded with an access code;

generating multiple parallel BPSK symbols from the multiple tones;

converting the BPSK symbols into an encoded interleaved bit stream of the access code;

de-interleaving the encoded interleaved bit stream; and

recovering the access code from the encoded de-interleaved bit stream.

35.   (Original) The method of claim 34, wherein performing FFT comprises generating repeated BPSK symbols;

wherein the method further comprises generating a selected set of BPSK symbols from the repeated BPSK symbols; and

wherein performing the BPSK comprises converting the selected set of BPSK symbols into the encoded interleaved bit stream.

36.   (Original) The method of claim 35, wherein performing the FFT comprises converting the IFFT symbols into repeated sets of three BPSK symbols; and

wherein generating the selected set of BPSK symbols comprises selecting three BPSK symbols from the repeated sets of three BPSK symbols to generate the selected set of BPSK symbols.

37.   (Original) The method of claim 35, wherein performing the FFT comprises converting the IFFT symbols into repeated sets of three BPSK symbols; and

wherein generating the selected set of BPSK symbols comprises selecting one of the repeated sets of three BPSK symbols to generate the selected set of BPSK symbols.

38.   (Original) The method of claim 34, further comprising:

storing a cryptographic key;

verifying the access code using the cryptographic key; and

granting access if the access code is verified.

39.   (Original) The method of claim 34, further comprising:

receiving multiple tones encoded with a personal identification number (PIN);

recovering the PIN from the multiple tones encoded with the PIN; and

granting access if the access code and the PIN are verified.

40.   (Currently Amended) The method of claim 34, further comprising:

generating generate time elements; and

wherein verifying the access code comprises verifying the access code using the cryptographic key and a time element.

41.   (Original) Apparatus for use in verification comprising:

means for receiving multiple tones encoded with an access code;

means for demodulating the multiple tones into inverse fast fourier transform (IFFT) symbols;

means for performing fast fourier transform (FFT) to generate repeated BPSK symbols from the IFFT symbols;

means for generating a selected set of BPSK symbols from the repeated BPSK symbols;

means for converting the selected set of BPSK symbols into an encoded interleaved bit stream of the access code;

means for de-interleaving the encoded interleaved bit stream; and

means for recovering the access code from the encoded de-interleaved bit stream.

42.   (Original) The apparatus of claim 41, further comprising:

means for storing a cryptographic key;

means for verifying the access code using the cryptographic key; and

means for granting access if the access code is verified.

43.   (New) A machine readable medium having one or more instructions for use in authentication, which when executed by a processor causes the processor to:

store a cryptographic key and a look up table (LUT);

generate an access code using the cryptographic key;

generate multiple parallel binary phase shift keying (BPSK) symbols based upon the access code;

convert the BPSK symbols into multiple tones encoded with the access code using the LUT; and

output the multiple tones encoded with the access code for authentication.

44.   (New) The machine-readable medium of claim 43, having one or more instructions
which when executed by a processor causes the processor to further:

        repeat the BPSK symbols a selected number of times before converting the BPSK
symbols.

45.   (New) The machine-readable medium of claim 44, wherein repeating the BPSK
symbols comprises repeating a set of three BPSK symbols the selected number of
times; and

        wherein converting the BPSK symbols comprises converting each set of three BPSK
symbols into the multiple tones using the LUT.

46.   (New) The machine-readable medium of claim 43 having one or more instructions
which when executed by a processor causes the processor to further:

        add to the multiple tones, reference tones with reference phases; and

        output the reference tones with the multiple tones.

47.   (New) The machine-readable medium of claim 43, having one or more
instructions which when executed by a processor causes the processor to further:

        generate time elements; and

        wherein generating the access code comprises generating the access code using the
cryptographic key and a time element.

48.   (New) The machine-readable medium of claim 43, having one or more instructions
which when executed by a processor causes the processor to further:

        receive a user command; and

        wherein generating the access code comprises generating the access code when the user
command is received.

49.   (New) The machine-readable medium of claim 43, having one or more instructions which
when executed by a processor causes the processor to further:

        amplify the multiple tones before outputting the multiple tones.

50.   (New) The machine-readable medium of claim 43, having one or more instructions which when executed by a processor causes the processor to further:

receive a personal identification number (PIN);

convert the PIN into multiple tones encoded with the PIN; and

output the multiple tones encoded with the PIN for authentication.

51.   (New) A machine readable medium having one or more instructions for use in authentication, which when executed by a processor causes the processor to:

store a cryptographic key;

generate an access code using the cryptographic key;

generate multiple parallel binary phase shift keying (BPSK) symbols based upon the access code;

repeat the BPSK symbols a selected number of times before converting the BPSK symbols;

perform inverse fast fourier transform (IFFT) on the repeated BPSK symbols to generate IFFT symbols;

modulate the IFFT symbols into the multiple tones encoded with the access code; and

output the multiple tones encoded with the access code for authentication.

52.   (New) The machine-readable medium of claim 51, wherein repeating the BPSK symbols comprises repeating a set of three BPSK symbols the selected number of times; and

wherein converting the BPSK symbols comprises converting each set of three BPSK symbols into the multiple tones using the LUT.

53.   (New) A machine readable medium having one or more instructions for use in verification, which when executed by a processor causes the processor to:

receive multiple tones encoded with an access code;

generate multiple parallel BPSK symbols from the multiple tones;

convert the BPSK symbols into an encoded interleaved bit stream of the access code; de-interleave the encoded interleaved bit stream; and

recover the access code from the encoded de-interleaved bit stream.

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54.   (New) The machine-readable medium of claim 53, wherein performing FFT comprises generating repeated BPSK symbols;

  wherein the method further comprises generating a selected set of BPSK symbols from the repeated BPSK symbols; and

  wherein performing the BPSK comprises converting the selected set of BPSK symbols into the encoded interleaved bit stream.

55.   (New) The machine-readable medium of claim 54, wherein performing the FFT comprises converting the IFFT symbols into repeated sets of three BPSK symbols; and

  wherein generating the selected set of BPSK symbols comprises selecting three BPSK symbols from the repeated sets of three BPSK symbols to generate the selected set of BPSK symbols.

56.   (New) The machine-readable medium of claim 54, wherein performing the FFT comprises converting the IFFT symbols into repeated sets of three BPSK symbols; and

  wherein generating the selected set of BPSK symbols comprises selecting one of the repeated sets of three BPSK symbols to generate the selected set of BPSK symbols.

57.   (New) The machine-readable medium of claim 53, having one or more instructions which when executed by a processor causes the processor to further:

  store a cryptographic key;

  verify the access code using the cryptographic key; and

  grant access if the access code is verified.

58.   (New) The machine-readable medium of claim 53, having one or more instructions which when executed by a processor causes the processor to further:

  receive multiple tones encoded with a personal identification number (PIN);

  recover the PIN from the multiple tones encoded with the PIN; and

  grant access if the access code and the PIN are verified.

59.   (New) The machine-readable medium of claim 53, having one or more instructions
which when executed by a processor causes the processor to further:

     generate time elements; and

     wherein verifying the access code comprises verifying the access code using the
cryptographic key and a time element.